

REMARKS

The Office Action dated August 25, 2004 has been received and carefully noted. The above amendments to the abstract and claims, and the following remarks, are submitted as a full and complete response thereto.

Claims 21-24, 26-29 and 31-42 have been amended to more particularly point out and distinctly claim the subject matter of the invention. Additionally, the abstract has been amended to more clearly describe the invention. No new matter has been added. Claims 21-42 are currently pending in the application and are respectfully submitted for consideration.

The Office Action objected to the abstract of the disclosure due to certain informalities. Specifically, the Office Action objected to the use of the words “discloses” and “said.” The Office Action also state that the phrases “By the this method” and “there, is no a direct connection” are unclear. The abstract has been amended to remove all occurrences of “said” and “discloses,” in addition to correcting the other informalities. Therefore, Applicants respectfully submit that the objection to the abstract is rendered moot.

The Office Action objected to claims 40 and 41 because they recite “The radio network according to any one of the claims 33.” Claims 40 and 41 have been amended such that they now recite “The radio network according to claim 33.” Thus, the objection to claims 40 and 41 is rendered moot.

Claims 21-42 were rejected under 35 U.S.C. §112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter of the invention. The Office Action alleges that several limitations recited in the claims lack sufficient antecedent basis. Claims 21-24, 27-29 and 31-42 have been amended to more particularly point out and distinctly claim the subject matter of the invention. Therefore, Applicants respectfully submit that the rejection of claims 21-42 under 35 U.S.C. §112, second paragraph, is rendered moot.

In the Office Action, claims 21, 22, 25-35 and 38-42 were rejected under 35 U.S.C. §103(a) as being unpatentable over Dupray (WO 98/10307) in view of Snyder (U.S. Patent No. 6,201,497). The Office Action took the position that Dupray discloses all of the elements of the claimed invention, with the exception of the mobile base station forwarding location signals from the base station. The Office Action then relies upon Snyder as disclosing this limitation of the claimed invention. The above rejection is respectfully traversed for the reasons which follow.

Claim 21, upon which claims 22-32 are dependent, recites a method for locating a mobile station in a mobile telecommunication system. The method includes the steps of using fixed transmitting stations for positioning a target mobile station by transmitting a location signal from each fixed transmitting station to the target mobile station and receiving a response to the location signal from the target mobile station by the fixed transmitting stations, and using at least one relay station which is configured to receive the location signal from the corresponding fixed transmitting station and the response

from the target mobile station, and to forward the location signal and the response to the target mobile station and the fixed transmitting stations, respectively, in case a direct transmission from or to at least one of the fixed transmitting stations is not available. The method further includes the steps of determining a position of the at least one relay station, determining a distance between the target mobile station and the fixed transmitting stations and/or the at least one relay station on a basis of the location signal, and locating a position of the target mobile station on a basis of the determined distances.

Claim 33, upon which claims 34-42 are dependent, recites a radio network of a mobile telecommunication system. The radio network includes fixed transmitting stations, at least one relay station, location means, and determination means. The fixed transmitting stations are configured for positioning a target mobile station by transmitting a location signal from each fixed transmitting station to the target mobile station and receiving a response to the location signal from the target mobile station by the fixed transmitting stations. The at least one relay station is configured to receive the location signal from the corresponding fixed transmitting station and the response from the target mobile station, and to forward the signals to the target mobile station and the fixed transmitting station, respectively, in case a direct transmission from and to at least one of the fixed transmitting stations is not available. The location means determines a position of the at least one relay station and the determination means determines a distance between the target mobile station and the fixed transmitting stations and/or the at least

one relay station on a basis of the location signal. The radio network is configured to locate the position of the target mobile station on a basis of the determined distances.

Consequently, the claimed invention provides a method for locating the position of a mobile station. More specifically, the method can reliably locate the position of a mobile station even if no direct connection to a base station is possible.

As will be discussed below, the cited prior art references fail to disclose or suggest all of the elements of the claims, and therefore fail to provide the features discussed above.

Dupray discloses a wireless mobile station location system. The system includes a high level signal processing subsystem for performing high level data processing for providing location estimates of mobile stations. The system provides composite signal characteristic values to MS location hypothesizing computational models, which subsequently determine one or more initial estimates of the location of the target MS based on signal processing techniques. Each of the models outputs MS location estimates and a confidence value indicating the probability that the target MS resides in a corresponding location estimate for the target MS. The system then adjusts the location hypotheses output by the models so that the adjusted location hypotheses provide better target MS location estimates. A “most likely” target MS location estimate for outputting to a location request application is subsequently computed (Dupray, Page 12, line 28 – Page 13, line 9). The system includes (1) a location center 142 which is required for determining a location of the target MS 140 using signal characteristic values for this

target MS, (2) mobile base stations 148 (MBS), which are optional, for physically travelling toward the target MS 140, and (3) a plurality of location base stations 152 (LBS) having relatively small MS 140 detection area 154, which are optional, distributed within the radio coverage areas 120 (Dupray, Page 26, lines 13-19).

Snyder discloses a system for use of GPS receivers separated by a barrier from being in the line of sight of orbiting Global Navigation Satellite Systems. The system includes a receiver with antenna positioned in direct line of sight of a public radio positioning/navigational system. The acquired signals are passed through the line of sight barrier, identified, amplified and relayed to a strategically arrayed constellation of broadcast antenna. The radio positioning/navigational receiver located within a line of sight barrier receives the repeated, geometrically non-linear signals and utilizes appropriate software to calculate its coordinates within a line of sight barrier to be used for positioning and navigational purposes.

Applicants respectfully submit that the combination of Dupray and Snyder fails to disclose or suggest a relay station that is configured to receive a location signal from a fixed transmitting station and a response from a target mobile station, and also configured to forward the location signal to the target mobile station and forward the response to the fixed transmitting station when direct transmission from or to the fixed transmitting stations is not possible, as recited in claims 21 and 33.

Dupray only discloses a mobile base station (MBS) which acts as a partially-functional moving base station. The MBS provides a forward link pilot channel for a

target mobile station and receives unique BS pilot strength measurements from the mobile station. The MBS also includes a mobile station for data communication with the location center via a base station. The data communication includes telemetering the geographic position of the MBS and various RF measurements related to signals received from the mobile station (Dupray, Page 28, Lines 9-20). Dupray, however, fails to disclose that the MBS receives a location signal from a fixed transmitting station and a response from a target mobile station, and then forwards the location signal to the target mobile station and the response to the fixed transmitting station when direct transmission from or to the fixed transmitting stations is not possible, as recited in the present claims. Therefore, Dupray fails to disclose or suggest all of the elements of claims 21 and 33.

Furthermore, Snyder also fails to disclose the relay station of the present invention. Snyder merely discloses antennas 130, 131, 132, and 133 that are arranged in a geometric pattern that is efficient for accurate triangulation with a suitable positioning/navigation system (Snyder, Column 7, lines 16-27). However, these antennas are fixed and therefore do not correspond to the relay stations disclosed in claims 21 and 33 of the current invention. Moreover, Snyder makes no mention of any base stations. As such, the functions of the antennas in Snyder are completely different from that of the relay stations of the claimed invention.

Therefore, for at least the reasons discussed above, Dupray and Snyder, whether viewed alone or in combination, fail to disclose or suggest all of the elements of claims 21 and 33. Applicants note that claims 22, 25-32, 34, 35 and 38-42 are dependent upon

claims 21 and 33, respectively. Thus, Applicants submit that claims 22, 25-32, 34, 35 and 38-42 should be found allowable for at least their dependence upon claims 21 and 33, and for the specific limitations recited therein.

Claims 23 and 36 were rejected under 35 U.S.C. §103(a) as being unpatentable over Dupray in view of Snyder, and further in view of Vazvan (WO 96/01531). Applicants note that the Office Action fails to mention what is lacking in the combination of Dupray and Snyder, and therefore fails to state the reason for the reliance upon Vazvan. The rejection is respectfully traversed for the following reasons.

Dupray and Snyder are discussed above. Vazvan discloses a cellular positioning system. A position, speed and direction of a mobile terminal is computed using a unique code, predefined free time intervals (4) or the time period of other code slots (5) located between any transmitted or received pair of code (4, 5), the arrival time of each pair of codes, the timing advances defined either in mobile terminal or in three or more base stations (3, 10), and an area map transmitted by the base stations. At least three base stations (3, 10) communicate with the mobile terminal (2) in order to define its position, speed and direction by measuring the distances between the base stations (3 or 10) and the mobile terminal (2) and computing the intersection points (A, B), of three or more distance measurements.

Applicants note that claims 23 and 36 are dependent upon claims 21 and 33, respectively. Applicants respectfully assert that the combination of Dupray, Snyder and Vazvan also fails to disclose or suggest a relay station which forwards a location signal to

the target mobile station and a response to the fixed transmitting station when direct transmission is not possible. As such, Applicants submit that Dupray, Snyder and Vazvan, whether viewed alone or in combination, fail to disclose or suggest all of the elements of claims 23 and 26. Furthermore, claims 23 and 26 should also be found allowable for at least their dependence upon claims 21 and 33, and for the specific limitations recited therein.

Claims 25, 26, 38 and 39 were rejected under 35 U.S.C. §103(a) as being unpatentable over Dupray in view of Snyder, and further in view of Havinis (U.S. Patent No. 6,167,266). The Office Action took the position that Dupray and Snyder disclose all of the elements of claims 25, 26, 38, and 39, with the exception of the authorization of location requests. The Office Action then relies upon Havinis as curing this deficiency in Dupray and Snyder. The rejection is respectfully traversed for the reasons which follow.

Dupray and Snyder are discussed above. Havinis discloses a method for handling positioning triggers for batch location requests in a location services system. A location application transmits batch location requests to a positioning gateway requesting the addition or removal of positioning triggers in association with a number of subscribers. Upon receipt of the batch location requests, the positioning gateway determines whether or not the location application is authorized to make the batch location requests. Upon confirmation of authorization, a message is forwarded from the positioning gateway to the HLR associated with each subscriber in the batch location requests. This message includes information enabling the positioning trigger, subscription override key and

positioning gateway address to be stored within a HLR record associated with the subscriber is to be armed. A message is then transmitted from the HLR of the subscriber to the MSC/VLR serving the subscriber. This message either causes the arming of a positioning trigger for a subscriber by storing information concerning the positioning trigger in the MSC/VLR record of the subscriber or the removal of a positioning trigger information from the MSC/VLR record of the indicated subscriber.

Applicants note that claims 25, 26, 38 and 39 are dependent upon claims 21 and 33, respectively. Applicants submit that Havinis fails to cure the deficiencies in Dupray and Snyder as discussed above with respect to claims 21 and 33. Thus, the combination of Dupray, Snyder and Havinis fails to disclose or suggest all of the elements of claims 25, 26, 38 and 39. Furthermore, claims 25, 26, 38 and 39 should be found allowable for at least their dependence upon claims 21 and 33, and for the specific limitations recited therein.

Claims 30 and 40 were rejected under 35 U.S.C. §103(a) as being unpatentable over Dupray in view of Snyder and further in view of Kangas (U.S. Patent No. 6,356,763). The Office Action took the position that Dupray and Snyder disclose all of the elements of claims 30 and 40, with the exception of the use of WCDMA. The Office Action then relies upon Kangas as curing this deficiency in Dupray and Snyder. The rejection is respectfully traversed for the following reasons.

Dupray and Snyder are discussed above. Kangas discloses a mobile station in a wireless communication network for measuring the respective times of arrival of radio

signals transmitted by a plurality of radio transmitters in the network. The mobile station is provided with real time difference information indicative of differences between a time base used by a radio transmitter serving the mobile station and respective time bases used by the other radio transmitters. The mobile station determines a plurality of points in time at which the respective radio signals are expected to arrive at the mobile station. For each radio signal, the mobile station monitors for arrival of the radio signal during a period of time after the point in time at which the radio signal is expected to arrive.

Applicants respectfully submit that Dupray, Snyder and Kangas, whether viewed alone or in combination, fail to disclose or suggest that the method and network of the claimed invention is implemented in WCDMA., as recited in claims 30 and 40. Kangas only discloses that the air interface may be implemented according to WCDMA techniques. Additionally, the combination of these references fails to disclose or suggest that the systems of Dupray and Snyder would be compatible with a WCDMA network. As such, Applicants respectfully submit that the combination of Dupray, Snyder and Kangas fails to disclose or suggest the elements of claims 30 and 40. Furthermore, claims 30 and 40 are dependent upon claims 21 and 33, respectively. Therefore, claims 30 and 40 should be found allowable for at least their dependence upon claims 21 and 33, and for the specific limitations recited therein.

In the Office Action, claims 23, 24, 36 and 37 were objected to as being dependent upon a rejected base claim, but were indicated as being allowable if rewritten in independent form including all of the limitations of the base claim and any intervening

claims. Applicants respectfully assert that these claims recite patentable subject matter in their current form. Therefore, at this time, Applicants have not rewritten claims 23, 24, 36, and 37 into independent form.

Applicants respectfully submit that the cited prior art fails to disclose or suggest critical and important elements of the claimed invention. These distinctions are more than sufficient to render the claimed invention unanticipated and unobvious. It is therefore respectfully requested that all of claims 21-42 be allowed, and this application passed to issue.

If for any reason the Examiner determines that the application is not now in condition for allowance, it is respectfully requested that the Examiner contact, by telephone, the applicants' undersigned attorney at the indicated telephone number to arrange for an interview to expedite the disposition of this application.

In the event this paper is not being timely filed, the applicants respectfully petition for an appropriate extension of time. Any fees for such an extension together with any additional fees may be charged to Counsel's Deposit Account 50-2222.

Respectfully submitted,



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Enclosures: Petition for Extension of Time